



NSWCAM SOP1

Ground shooting of feral camels

Background

Ground shooting is usually conducted with the aid of all-terrain vehicles and is best suited to accessible and relatively flat areas where there are low numbers of problem camels. Ground shooting is also used for euthanasia of sick or injured camels. Shooting from a helicopter is considered a more humane control method as mobile wounded animals can be promptly located and killed. Shooting can be a humane method of killing feral camels when it is carried out by experienced, skilled shooters, the animal can be clearly seen and is within range, the correct firearm, ammunition and shot placement is used, and wounded animals are promptly located and killed.

This standard operating procedure (SOP) is a guide only - it does not replace or override the relevant NSW or federal legislation. The SOP should only be used subject to the applicable legal requirements (including WHS) operating in the relevant jurisdiction.

Individual SOPs should be read in conjunction with the overarching Code of Practice for that species to help ensure that the most appropriate control techniques are selected and that they are deployed in a strategic way, usually in combination with other control techniques, to achieve rapid and sustained reduction of pest animal populations and impacts.

Application

- Ground shooting should only be used in a strategic manner as part of a coordinated program designed to achieve sustained effective control.
- The remoteness and low density mean that searching and ground shooting is time consuming and labour intensive. It is therefore not considered an effective method for large-scale control.
- Ground shooting as a means of population control is not suitable in inaccessible or rough terrain where sighting of target animals and accurate shooting is difficult or when wounded animals cannot easily be followed up and killed, in these circumstances aerial shooting may be the preferred technique.
- The optimal period for ground shooting is during dry seasons or droughts when groups of camels are forced to congregate around remaining areas of water or succulent feed. Shooting during drought may reduce the number of camels that may otherwise die slowly of hunger or thirst.
- Frequent shooting from the ground may teach camels to avoid certain areas, making overall control difficult.

- Shooting of feral camels should only be performed by skilled operators who have the necessary ability and experience with firearms and who hold the appropriate licenses and accreditation.
- Storage and transportation of firearms and ammunition must comply with relevant legislative requirements. (See *Firearms Act 1996*, *Firearms Regulation 2017*).

Animal welfare implications

Target animals

- The humaneness of shooting as a control technique depends almost entirely on the skill and judgement of the shooter. If properly carried out, it is one of the most humane methods of killing camels.
- Shooting must be conducted with the appropriate firearms and ammunition and in a manner that aims to cause immediate insensibility and painless death.
- When shooting an animal, it must be clearly visible, and able to be killed with a single shot due to the difficulty of follow-up shots from the ground, particularly in difficult terrain. A solid rest or support should be utilised to ensure accurate shot placement.
- Only head (brain) or chest (heart-lung) shots must be used. A well-placed shot to the head to destroy the brain will result in instantaneous insensibility and a quicker death compared to a well-placed shot to the chest. Chest shots to destroy the heart can present challenges for accurate placement and may not always result in rapid death. For this reason, under ideal conditions, head shots are preferred over chest shots, however in some situations (e.g., where close approach is not possible; the head is obstructed or cannot be targeted; the animal is already wounded; or a second 'follow-up' shot can be quickly taken), because the chest is a larger target, a chest shot may be the most suitable option. Shooting at other parts of the body is unacceptable.
- Correctly placed head shots cause brain function to cease, and insensibility will be immediate. Death from a shot to the chest is due to massive tissue damage and haemorrhage from major blood vessels. Insensibility will occur sometime after, from a few seconds to a minute or more. If a shot stops the heart functioning, the animal will lose consciousness very rapidly.
- The shooter must be certain that each animal or defined group of animals is dead by physical inspection before another is targeted.
- Wounded camels must be located and dispatched as quickly and humanely as possible with a second shot preferably directed to the head. If left, wounded animals can escape and suffer from pain and the disabling effects of the injury.
- If lactating cows are shot, reasonable efforts should be made to find dependent calves and kill them quickly and humanely with a shot to the brain.

Non-target animals

- Shooting is relatively target specific and does not usually impact other species. However, there is always a risk of injuring or killing non-target animals, including livestock, if shots are taken at movement, colour, shape or sound. Only shoot at the target animal once it

has been positively identified. Never shoot over the top of hills or ridges as other animals or people may be out of sight and be in the danger zone of a stray bullet.

- Non-target camels can also be injured if a bullet passes through the target animal and hits another animal.

Workplace health and safety considerations

- Firearms are hazardous. Everyone should stand well behind the shooter when an animal is being shot. The line of fire must be chosen to prevent accidents or injury from stray bullets or ricochets.
- Shooting from a vehicle is potentially dangerous. An agreed safety procedure between the shooter and others in the vehicle must be in place to ensure that people do not enter the field of fire or disturb the taking of a shot.
- Firearm users must strictly observe all relevant safety guidelines relating to firearm ownership, possession and use.
- Firearms must be securely stored in a compartment that meets state legal requirements. Ammunition must be stored in a locked container separate from firearms.
- The shooter and others in the immediate vicinity should wear adequate hearing protection to prevent irreversible hearing damage, and safety glasses to protect eyes from gases, metal fragments and other particles.
- Care must be taken when handling feral camel carcasses as they may carry diseases such as ringworm, mange, and melioidosis that can affect humans and other animals. Routinely wash hands and other skin surfaces after handling carcasses.

Equipment required

Firearms and ammunition

- Large calibre, high powered centrefire rifles fitted with a telescopic sight must be used.
- The minimum firearm and ammunition requirements for the ground shooting of feral camels are:
 - calibre: .308 inches
 - bullet weight: 150 grain
 - muzzle energy: 2649 ft-lbs
- Examples of acceptable firearm and ammunition combinations with maximum shooting distances are included in the table below:

Cartridge	Bullet weight (gr)	Muzzle velocity (ft/sec)	Muzzle energy (ft-lbs)	Maximum distance (metres)
.308 Winchester	150	2820	2649	200
.300 Win Mag	150	3275	3572	200

Source: <https://press.hornady.com/assets/pctthumbs/tmp/1410995911-2019-Standard-Ballistics-Chart.pdf>

- Ammunition must expand and should be heavily constructed, controlled expansion or bonded core projectiles.
- Shotguns are NOT recommended for use on feral camels. If they must be used in an emergency situation, rifled slugs are to be used as ammunition.
- The accuracy and precision of firearms should be tested against inanimate targets prior to the commencement of any shooting operation.

Other equipment

- Lockable firearm box.
- Lockable ammunition box.
- Personal protective equipment (hearing and eye protection).
- First Aid kit.
- Appropriate maps identifying access trails and land tenure.
- Communication devices (e.g., 2-way radios / mobile or satellite phones) are recommended for safety reasons.

Procedures

- Camels should NOT be shot from a moving vehicle as this can significantly detract from the shooters' accuracy.
- Ensure you are in a firm, safe and stable position before taking a shot.

Target and shot placement

- The objective is to fire at the closest range practicable in order to reduce the risk of non-lethal wounding. Accuracy with a single shot is important to achieve an immediate and, therefore, humane death.
- A camel should only be shot at when:
 - it is stationary and can be clearly seen and recognised;
 - it is within the effective range of the firearm and ammunition being used; and
 - a humane kill is probable. If in doubt, do NOT shoot.
- Ensure there are no other camels behind the target animal that may be wounded by the shot passing through the target.
- Although camels are large animals, the vital areas targeted for clean killing are small. Shooters should be highly skilled and experienced at shooting and be able to accurately judge distance, wind direction and speed and have a thorough knowledge of the firearm and ammunition being used.

- The shooter must aim either at the head, to destroy the major centres at the back of the brain near the spinal cord or, at the chest, to destroy the heart, lungs and greater blood vessels. This can be achieved by one of the following methods (also see Figure 1).

Head Shots (This is the preferred shot placement)

Placement for head and chest shots are detailed below and in Figure 1.

Poll position (rear view)

- The firearm should be aimed at the back of the head at the intersection of the skull and the neck and directed towards the mouth i.e., perpendicular to the neckline.

Temporal position (side view)

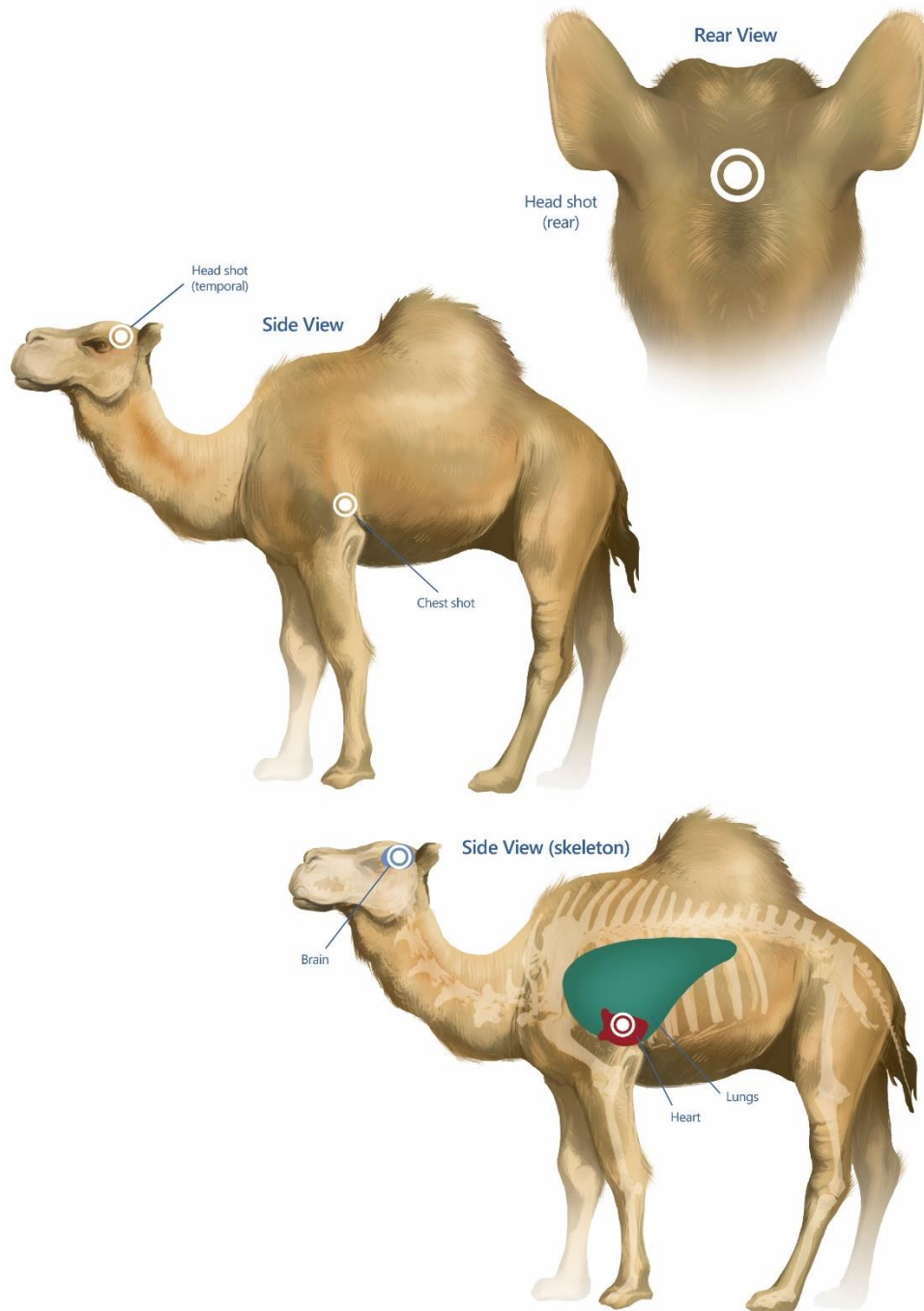
- The camel is shot from the side so that the bullet enters the skull midway between the eye and the base of the ear. The bullet should be directed horizontally.
- Note that frontal brain shots are not recommended during ground shooting of camels since the shape of the skull can cause bullet deflection.

Chest Shots

Side view

- The firearm is aimed horizontally at the centre of a line encircling the minimum girth of the animal's chest, immediately behind the forelegs. The shot should be taken slightly behind and below the shoulder at the point immediately behind the elbow. This shot needs to be angled forward at 40-45° to the camel's body to hit the heart.
- Shooting of individuals should stop when the flight response of the herd limits further accurate shooting.
- Where possible calves and juveniles should be shot before shooting mature camels.
- The target animal or animals in a defined group should be physically checked to ensure they are dead before moving on to the next animal or group. *Always approach the animal from the dorsal (or spinal) side to prevent injury from kicking legs.* Death of shot animals can be confirmed by observing a combination of the following:
 - no heartbeat
 - no breathing
 - no corneal reflex (no blinking when the eyeball is touched)
 - no response to a painful stimulus (e.g., a pinch of the ear tip).
- If death cannot be verified, a second shot to the head should be taken immediately.

Figure 1: Shot placement for ground shooting of camels



Note that shooting an animal from above or below the horizontal level as depicted here will influence the direction of the bullet through the body. Adjustment to the point of aim on the external surface of the body may need to be made to ensure that the angled bullet path causes extensive (and therefore fatal) damage to the main organs in the target areas.

References

- Aebischer, N.J., Wheatley, C.J., & Rose, H.R. (2014). Factors associated with shooting accuracy and wounding rate of four managed wild deer species in the UK, based on anonymous field records from deer stalkers. *PLoS One*, 9: e109698.
- American Veterinary Medical Association (AVMA). (2020). *AVMA guidelines for the euthanasia of animals: 2020 edition*. American Veterinary Medical Association. Available at: <https://www.avma.org/sites/default/files/2020-01/2020-Euthanasia-Final-1-17-20.pdf>
- American Veterinary Medical Association (AVMA). (2016). *AVMA Guidelines for the Humane Slaughter of Animals: 2016 Edition*. Available at: <https://www.avma.org/sites/default/files/resources/Humane-Slaughter-Guidelines.pdf>
- Anon. (2000). *Farmnote: Feral Camel*. Department of Primary Industries and Regional Development, Western Australia. Available at: <https://agric.wa.gov.au/n/2310>
- Anon. (2016). *Night shooting in the UK: A Code of Practice*. Available at: <https://basc.org.uk/codes-of-practice/night-shooting/>
- Bengsen, A.J., Forsyth, D.M., Harris, S., Latham, A.D., McLeod, S.R., and Pople, A. (2020). A systematic review of ground-based shooting to control overabundant mammal populations. *Wildlife Research*, 47: 197-207.
- Brown, A. (2004). *A review of camel diseases in Central Australia*. Department of Business, Industry and Resource Development, Arid Zone Research Institute, Alice Springs, NT.
- Bucknell, R. (2001) *Foxing with lamp and rifle*. Foxearth Publishing, Springfield, Chelmsford, Essex, United Kingdom.
- DeNicola, A. J., Miller, D. S., DeNicola, V. L., Meyer, R. E., & Gambino, J. M. (2019). Assessment of humaneness using gunshot targeting the brain and cervical spine for cervid depopulation under field conditions. *PLoS One*, 14: e0213200.
- Edwards, G.P., McGregor, M., Zeng, B., Saalfeld, W.K., Vaarzon-Morel P. & Duffy M. (2008). *Overview of the project- Cross jurisdictional management of feral camels to protect NRM and cultural values*, DKCRC Report 54. Desert Knowledge Cooperative Research Centre, Alice Springs.
- Edwards, G.P., Zeng, B., Saalfeld, W. K. & Vaarzon-Morel, P. (2010) Evaluation of the impacts of feral camels. *The Rangeland Journal*, 32: 43-54.
- Finnie, J. (1997). Traumatic head injury in ruminant livestock. *Australian Veterinary Journal* 75, 204-208.
- Gregory, N. (2004). *Physiology and behaviour of animal suffering*. Oxford, UK: Blackwell
- Lambooi, B. & Algers, B. (2016). Mechanical stunning and killing methods. In: Verlade A, Raj M (eds.) *Animal Welfare at Slaughter*. Sheffield, U.K: 5M Publishing.
- Ramsay, B.J (1994). *Commercial use of wild animals in Australia*. Australian Government Publishing Service, Canberra.
- Smith, G. (1999). *A guide to hunting and shooting in Australia*. Regency Publishing, South Australia.

- Stokke, S., Arnemo, J. M., Brainerd, S., Söderberg, A., Kraabøl, M., & Ytrehus, B. (2018). Defining animal welfare standards in hunting: body mass determines thresholds for incapacitation time and flight distance. *Scientific Reports*, *8*: 13786.
- Urquhart, K. A. & McKendrick, I. J. (2003). Survey of permanent wound tracts in the carcasses of culled wild red deer in Scotland. *Veterinary Record*, *152*: 497-501.
- Woods, J., Shearer, J.K. & Hill, J. (2010). Recommended On-farm Euthanasia Practices. Pp 186-213 in: Grandin T (ed.) *Improving Animal Welfare: A Practical Approach*. CABI, Wallingford, Oxfordshire, U.K.